

June 2005, Number 109

TAX REVENUE VOLATILITY AND A STATE-WIDE EDUCATION SALES TAX

Recently there have been proposals to shift that portion of K-12 education costs borne by local property taxes to a state-wide sales tax. While there are many reasons to look for alternatives to local property taxes for K-12 education, an argument in favor of a property tax is its inherent predictability. Once property assessments are finalized and a property tax digest adopted, there is a high degree of certainty about how much revenue a given millage rate will produce. Other major taxes, i.e. sales tax and income tax, are not so predictable; they are sensitive to short-term changes in local, regional, national economic conditions, and even federal tax law changes.

To provide background information on the issue of tax base volatility this brief first takes a look at the components and consequences of tax revenue volatility with an emphasis on state level sales and income taxes. Then various measures of property, sales, and personal income tax revenue volatility in Georgia are discussed. Finally, conclusions regarding implications of volatility on use of a state-wide sales tax to fund K-12 education are presented.

Tax Revenue Volatility

State and local governments are vulnerable to fluctuations in revenue derived from their taxes.

Generally, the services provided by the general funds of these governments are labor intensive with “locked in” expenses continuing from year to year. Schools, police forces, and fire departments, for example, have continuing long-term salary and other compensation obligations that typically amount to 70 percent or more of their total operating expenses. State legislatures, county commissions, boards of education, and city councils develop and adopt budgets months before actual revenues are known, and thus must base their expenditure decisions on expected revenue growth. State and local government finance is based on assumptions of predictable and steady growth. An unexpected (or “un-cushioned”) downturn in revenue, or even failure of expected revenue growth, can have important consequences for the delivery of public services perhaps even leading to reductions of the number of teachers, policemen, or firefighters.

State and local governments in the United States rely heavily on three taxes: property tax, sales tax, and income tax. In recent years, annual fluctuations in revenues from these taxes, especially sales and income taxes, have become increasingly pronounced and have contributed to major problems for state and local budget officials and legislators trying to manage public finances. California, for example, has faced significant

difficulties balancing its state budget in recent years due to tax revenue volatility (Vasché and Williams 2005). Generally, studies of tax revenue elasticity have found that income tax revenues are more responsive to changes in the rate of economic growth (that is they fluctuate more widely with economic changes) than revenues from sales taxes, but the difference is small. Property tax revenues are the least responsive to economic fluctuations (White 1983; Seyfried and Pantuosco 2003).

The various states and their local governments have different combinations or portfolios of taxes. The mix of taxes and their specific application has a major influence on government's ability to maintain its cash flow under changing economic conditions. Georgia, at the state level, gets about 35 percent of its revenue from the sales tax, about 48 percent from personal income taxes, and the remaining 17 percent from other sources. Georgia's neighbor Florida has no personal income tax, but relies on sales taxes for over 60 percent of its general state revenue. New York State, on the other hand, derives almost 60 percent of its state revenue from personal income taxes, but only 19 percent from sales taxes (Appendix A-1). Additionally, individual states' approach to these taxes also varies greatly. Not only do the 45 states that have sales taxes differ in the tax rate, but also in the items taxed. Thirty-seven exclude food purchases, or tax food at a lower rate. All exempt prescription drugs and eleven exempt non-prescription drugs. The number of services subject to sales tax ranges from 11 in Nevada to 157 in Hawaii (Dye 2004). State income tax structures also vary widely. Forty-one states have an income tax. Of these, six states have a single tax bracket flat tax; 34 have progressive multiple brackets (the lowest bracket in any state is 2.4 percent and the highest is 7 percent) and one state taxes at a percentage of federal liability (Dye 2004).

Because the tax mix and structure of taxes vary, there is wide variation in the way states' tax flows react to long- and short-term economic change and growth. Revenues from sales taxes that include food, for example, react less to short-term (business cycle related) economic changes than do those that do not tax food (Dye 2004). In the face of falling income people must still buy food, but when income rises additional money may be spent on non-food items. State income taxes that tax wealthier people at higher rates may be more volatile as higher income groups tend to have higher year-to-year income variance. Similarly, to the extent non-wage income (i.e. capital gains, dividends, etc) is taxed, income tax revenue will be more sensitive to market fluctuations (this source of

volatility has been specifically identified as a problem in California). Estimates of short-term sensitivity of taxes to business cycle fluctuations show that corporate income taxes are the most variable followed by non-food sales taxes, personal income taxes, retail sales taxes including food, and taxes on adjusted gross income. Motor fuel taxes and taxes of liquor sales are the least sensitive to cyclical economic changes. In the long run (not related to business cycles), relative to income growth, taxes of personal income have the greatest growth potential, followed by taxes on motor fuel, taxes on adjusted gross income, non-food retail, sales including food, and corporate income (Sobel and Holcombe 1996). States that rely heavily on corporate and personal income taxes (especially personal income taxes that include non-wage income), such as California, were the states hurt the most in the recession that began in 2001.

Tax Revenue Volatility in Georgia

To measure the volatility of sales, income, and property taxes attributable to fluctuation, we need to control for changes due to tax rate changes. Information was gathered for sales taxes, income taxes, and property tax revenues as well as total personal income in Georgia from 1966 to 2002 (2001 for personal income tax). State sales tax rates changed between 1988 and 1990. To control for this, we use the sales tax base for our analysis. The personal income tax rate has not changed over the period, but the effective tax rate has changed principally because tax brackets have not been changed in response to inflation. Consequently, taxable income as well as income tax revenue is used for analysis when appropriate. Property tax rates vary from year to year, thus we use the property tax base for this analysis.

From 1969 through 2002, property tax base grew at an average annual rate of 10.79 percent. During the same period the sales tax base grew at an annual average rate of 8.21 percent and sales tax revenue at 9.08 percent. Taxable income increased at 10.98 percent per year while revenue from the personal income tax grew at 12.76 percent annually. Chart 1 shows the historic trends of growth in the three tax bases.

A visual inspection of Chart 1 shows that the property tax base, on a state-wide basis, has enjoyed greater growth over the period than sales tax or personal income tax. In addition, inspection of Chart 1 indicates that the property tax may have been more stable – less volatile - than the other two.

There are several ways to look for indications of volatility. The first method used here is to compare the actual annual percentage change in each base from year-to-year to the average percentage change. We use these differences to compute the “coefficient of variation” (standard deviation divided by the mean) for each tax base. In other words, how much variance is there each year from a smooth growth curve? The results for both the entire study period and the most recent ten years of data are presented in Table 1. Higher numbers indicate greater volatility.

Using this measure, the property tax base has become more stable in recent years while personal income tax revenues base and the sales tax base have become less stable. We do not know the reasons for these changes, but in the case of property tax it is likely due to the state’s greater attention to assessment uniformity. For income and sales taxes the recent recession is a likely factor as is the “bursting” of the high-tech stock bubble.

As noted above, government budgets are based on assumptions of predictable and steady growth. Thus, another way to look at issues of volatility in tax bases is to examine how well one year’s base can be predicted from the last year’s value. For each of the three bases the percentage growth from one year (year 1) to the next (year 2) was calculated and the result multiplied by the actual year 2 base to predict year 3. The prediction was compared, as a percentage, to the actual year 3 base to get the prediction error. The process was repeated for each year through the study period. The average of the errors is used as an index so the three taxes may be compared. Table 2 presents the computed Annual Prediction Error Indices for the three taxes for the entire period and for sub periods. The larger the number, the greater the prediction error.

For the entire study period, the year-to-year changes in sales tax were the best predictor, but in the last ten years, the property tax has been the most consistent with the sales tax not performing much better than the personal income tax. These results are consistent with the results shown in Table 1.

Other measures of tax base volatility in Georgia were devised and computed. The results of these alternate measures are consistent with the measures reported above. In one test, multiple regression analysis was used to again measure predictive power of tax base history. Property tax tested as a better predictor than sales tax which was better than personal income tax. In another, variance in tax bases were compared to variance in total personal income (not taxable income).

Again the results are consistent. Property tax is more stable than sales tax which is more stable than personal income tax base.

Conclusions

In Georgia, the state’s sales tax base and personal income tax base have become more volatile in recent years, while the property tax base has become more stable. The trends for sales and income tax bases are not unusual as similar trends have been observed in many other states. Additionally, Georgia’s personal income tax tends to be slightly more volatile than the sales tax base; also a national trend. Reliance on these taxes has created a measure of “revenue uncertainty” in many states and localities because of their volatility.

In Georgia, a move away from use of property taxes to fund K-12 education toward a sales tax (or a personal income tax) is likely to introduce a greater measure of year-to-year uncertainty into revenue predictions for school budgets. Knowing this is likely to be the case, several policies could be considered to complement a more volatile tax:

- Avoid placing total reliance on one single tax base or revenue source for such a large item as state-wide K-12 education. The addition of a small property tax, for example, could increase revenue stability. While not advocating inclusion of a property tax, examination of alternative additional taxes is in order.
- Broaden the sales tax to include selected services. Exclusion of food from the sales tax has narrowed the base and made the tax more volatile. Inclusion of more services will broaden the base and, depending on the services included, may positively address volatility.
- Build-up budgetary reserves. This is probably the most effective and realistic tool for dealing with the revenue fluctuations almost certain to come with a shift away from use of property taxes to fund K-12 education. Revenues set aside during periods of growth can be used to preserve educational effort and programs during times of economic downturns. Creation and maintenance of large “rainy day” reserves is often beyond the ability and “political will” of local governments and boards of education. Use of such a strategy is more probable at a state level.

CHART 1. HISTORIC GROWTH OF TAX BASES IN GEORGIA

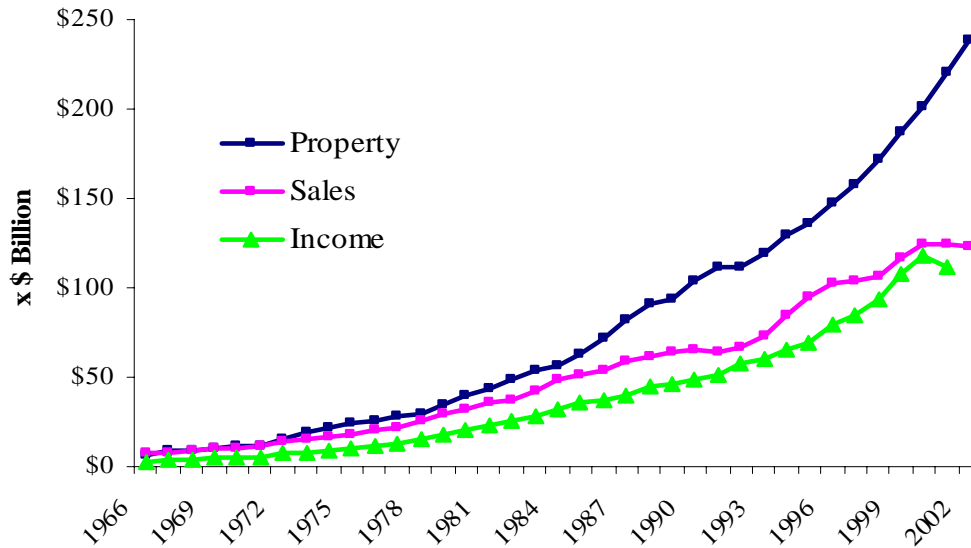


TABLE 1. COEFFICIENTS OF VARIATION IN TAX GROWTH

	Entire Study Period	Latest 10 Years
Property Tax Base	136.47	41.79
Sales Tax Base	64.18	80.17
Income Tax Revenue	76.29	95.52

TABLE 2. PREDICTION ERROR INDEX

	Property Tax Base	Sales Tax Base	Income Tax Revenue
Entire Period	4.50	3.99	4.70
1968 – 1980	6.98	4.31	6.51
1980 – 1991	3.57	3.27	3.28
1991 - 2002	2.63	4.26	3.82

APPENDIX A-1. MIX OF STATE TAX REVENUES BY MAJOR TYPE OF TAX
(Percent of Total Tax Revenues in 2001)

	General Sales	Personal Income	All Other
United States	32.0	37.2	30.8
Alabama	25.4	36.1	38.5
Alaska	0.0	0.0	100.0
Arizona	45.8	27.6	26.7
Arkansas	36.3	31.4	32.4
California	26.9	49.3	23.8
Colorado	26.0	51.5	22.5
Connecticut	31.9	42.7	25.3
Delaware	0.0	34.2	65.8
Florida	59.0	0.0	41.0
Georgia	34.1	48.2	17.6
Hawaii	46.8	31.5	21.7
Idaho	30.6	40.3	29.1
Illinois	27.3	33.1	39.6
Indiana	35.6	37.4	27.0
Iowa	34.0	36.6	29.3
Kansas	35.0	39.9	25.1
Kentucky	28.8	33.8	37.5
Louisiana	33.3	24.3	42.3
Maine	30.6	43.5	25.8
Maryland	24.5	43.8	31.7
Massachusetts	21.8	57.5	20.7
Michigan	34.7	30.5	34.8
Minnesota	27.9	43.6	28.5
Mississippi	49.0	21.8	29.3
Missouri	31.7	43.2	25.1
Montana	0.0	37.2	62.8
Nebraska	34.0	40.4	25.6
Nevada	53.5	0.0	46.5
New Hampshire	0.0	4.4	95.6
New Jersey	29.9	41.5	28.6
New Mexico	40.5	20.7	38.8
New York	19.6	58.9	21.5
North Carolina	22.2	48.2	29.6
North Dakota	29.2	18.3	52.5
Ohio	32.1	42.3	25.6
Oklahoma	24.2	35.9	39.8
Oregon	0.0	74.4	25.6
Pennsylvania	32.1	31.7	36.2
Rhode Island	31.0	41.3	27.7
South Carolina	39.0	39.0	22.1
South Dakota	52.7	0.0	47.3
Tennessee	58.5	2.5	39.1
Texas	50.0	0.0	50.0
Utah	36.3	41.9	21.8
Vermont	13.8	31.1	55.1
Virginia	20.2	55.2	24.6
Washington	63.6	0.0	36.4
West Virginia	27.1	29.8	43.1
Wisconsin	30.7	43.8	25.6
Wyoming	36.1	0.0	63.9

SOURCE: U.S. Census Bureau, Governments Division (<http://www.census.gov/govs/www/state01.html>).
(from Dye 2004)

References

- Dye, R.F. (2004). "State Revenue Cyclical." *National Tax Journal* 57 (1):133-46.
- Seyfried, W. and L. Pantuosco (2003). "Estimating the Sensitivity of State Tax Revenue to Cyclical and Wealth Effects." *Journal of Economics and Finance* 27 (1): 114-23.
- Sobel R.S. and R.G. Holcombe (1996). "Measuring the Growth and Variability of Tax Bases Over the Business Cycle." *National Tax Journal* 49 (4): 535-52.
- Vasché, J.D. and B. Williams (2005). "Revenue Volatility in California." *State Tax Notes* 36: 35-46.
- White, F.C. (1983). "Trade-Off in Growth and Stability in State Taxes." *National Tax Journal* 36 (1): 103-114.

ABOUT THE AUTHOR

John Matthews is a Research Associate in the Fiscal Research Center and a Ph.D. student in the Georgia State/Georgia Institute of Technology Joint Public Policy Program. John's main research interest is in urban growth policy.

ABOUT FRC

The Fiscal Research Center provides nonpartisan research, technical assistance, and education in the evaluation and design of state and local fiscal and economic policy, including both tax and expenditure issues. The Center's mission is to promote development of sound public policy and public understanding of issues of concern to state and local governments.

The Fiscal Research Center (FRC) was established in 1995 in order to provide a stronger research foundation for setting fiscal policy for state and local governments and for better-informed decision making. The FRC, one of several prominent policy research centers and academic departments housed in the School of Policy Studies, has a full-time staff and affiliated faculty from throughout Georgia State University and elsewhere who lead the research efforts in many organized projects.

The FRC maintains a position of neutrality on public policy issues in order to safeguard the academic freedom of authors. Thus, interpretations or conclusions in FRC publications should be understood to be solely those of the author. For more information on the Fiscal Research Center, call 404-651-2782.

RECENT PUBLICATIONS

Accountability for Economic Development Incentives in Georgia. This report identifies Georgia's major economic development incentives and other forms of public finance support and calls for a comprehensive evaluation of public expenditures in this area. (June 2005)

Teen Childbearing and Public Assistance in Georgia. This brief examines the link between teen births and welfare. (May 2005)

The Link Between Teen Childbearing and Employment in Georgia. This brief analyzes teen births and employment of teen mothers. (May 2005)

What Georgians Are Thinking About Taxes III. This brief is the third of three briefs reporting on telephone surveys of Georgians. (April 2005)

What Georgians Are Thinking About Taxes II. This brief is the second of three briefs reporting on telephone surveys of Georgians. (April 2005)

Fiscal Capacity of Counties in Georgia. This brief examines the fiscal strength of Georgia's counties. (April 2005)

For a free copy of any of the publications listed, call the Fiscal Research Center at 404/651-4342, or fax us at 404/651-2737. All reports are available on our webpage at: [//frc.aysps.gsu.edu/frc/index.html](http://frc.aysps.gsu.edu/frc/index.html).